

$$f^{-1}(i, 1) = \left\{ d_s \mid \min_{d_s \in X_i} \{d_s, a_2\} \right\} \quad \forall i = 1..w$$

In one embodiment, the left pixel row is placed according to Equation 3:

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Equation 3

$$f^{-1}(1, j) = \left\{ d_s \mid \min_{d_s \in Y_j} \{d_s, a_1\} \right\} \quad \forall j = 1..h$$

At step 440, the remaining pixels are iteratively placed in the sub-group. In one embodiment, the pixels are placed starting from the lower left of the sub-group to the and ending at the upper right of the sub-group. In one embodiment, if pixels at positions $(i-1, j)$ and $(i, j-1)$ are already placed, the pixel at position (i, j) is determined according to Equation 4:

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Equation 4

$$f^{-1}(i, j) = \left\{ d_s \mid \min_{d_s \in X_i \cap Y_j} \{d_s, a_1 + d_s, a_2\} \right\} \\ \text{if } X_i \cap Y_j \neq \emptyset$$

In one embodiment, where the data structures have been placed as described in step 410, the pixel to be placed at position can be determined in $O(1)$ time if

$X_i \cap Y_j \neq \emptyset$. If $X_i \cap Y_j = \emptyset$, the partitions X_i and Y_j must be iteratively extended and $d_i \in (X_i \cup X_{i+1}) \cap Y_j$ be considered.

In one embodiment, if this set is still empty, $d_i \in (X_i \cup X_{i+1}) \cap (Y_j \cup Y_{j+1})$ must be considered, and so on, until a data point to be placed is found. It should be appreciated that process 400 is efficient due to the data structure used.

Figure 5 is an illustration of an exemplary sub-group 500 in accordance with one embodiment of the present invention. It should be appreciated that sub-group 500 may be a group in instances where no second dividing attribute is selected. Sub-group 500 comprises a plurality of pixels. In one embodiment, the plurality of pixels are pixels of a display screen (e.g., a computer monitor).

Lower-left pixel 502 (e.g., position (1,1)) is placed first according to step 420 of process 400 (Figure 4). Lower pixel row 504 (e.g., position (i,1)) and left pixel row 506 (e.g., position (1,i)) are placed next, according to step 430 of process 400. Remaining pixels 508 (e.g., position (i+1, i+1),) are then placed in sub-group 500, according to step 440 of process 400.

The preferred embodiment of the present invention a method for placement of data for visualization of multidimensional data sets using multiple pixel bar charts, is

thus described. While the present invention has been described in particular embodiments, it should be appreciated that the present invention should not be construed as limited by such embodiments, but rather construed according to the below claims.

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